RESEARCH DEPARTMENT

TRANSMITTING AERIALS FOR THE CAMBRIDGE V.H.F. TELEVISION AND V.H.F. SOUND STATION

Technological Report No. E-117/5
UDC 621.396.712 1966/52

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for Head of Research Department

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INTRODUCTION

The Cambridge relay station came into operation on the 7th March 1966. It provides a television and sound service to Cambridge, Fen Ditton, Cherry Hinton, Teversham and parts of Histon and Girton.

SUMMARY OF INSTALLATION

Site:

The site is at the Newmarket Road gas works approximately 1·61 km east-north-east of the city centre, grid reference TL 465593, height 7·6 m a.m.s.l.

Support Structure:

The support structure consists of a 10·7 m (35 ft) length of parallel sided lattice mast of 0·61 m (2 ft) square cross section, mounted at a height of 35·1 m (115 ft) a.g.l. on top of the No.15 support column of the No.1 gasholder. The mast is surmounted by a 114 mm (4½ in.) diameter pole giving an overall height of 50·6 m (166 ft) a.g.l., and is screened on all sides by horizontal 25·4 mm (1 in.) diameter tubes spaced 0·229 m (9 in.) apart, between the levels 37·6 m (123 ft 6 in.) and 45·7 m (150 ft) a.g.l.

A similar unscreened lattice mast is used to support the receiving aerials and those of another user (Eastern Gas Board); it is mounted on top of the No.12 column of the gasholder.

General Arrangement:

See Fig. 1.

Band I

Channel:

Channel 2, with horizontal polarization is used. Vision and sound carriers are each offset -16·875 kHz.

Aerial:

The aerial[1] consists of two tiers each of a pair of horizontal crossed dipoles. The dipole limbs are mounted radially along bearings of 21°, 111°, 201° and 291° ETN, and fed with equal amplitude currents of relative phases 0°, 45°, 180° and 225° respectively. The inter-tier spacing is 0·55λ and the mean height 49 m (160 ft 9 in.) a.g.l. There are independent main feeders to each tier.

Power:

A single 100 watt translator amplifier is used.

Templet and horizontal radiation pattern (h.r.p.):

See Fig. 2 and Note 1.

Gain:

Mean intrinsic gain			0·8 dB
Deduct:	losses due to distribution feeder and possible mis-alignment		0·2 dB
Mean net gain			0·6 dB
Deduct:	loss in main feeder type RPC 2603	1·9 dB	
	Network loss	0·6 dB	2·5 dB
Mean effective gain			-1·9 dB

Band II

Carrier frequencies:	88·9 (Light), 91·1 (Third) and 93·3 (Home) MHz.		
Aerial:	The aerial[1] consists of four tiers each of three horizontal dipoles spaced 1·19 m (3 ft 11 in.) from the mast axis, oriented on bearings of 110°, 230° and 350° ETN. All dipoles are fed with equal co-phased currents. The inter-tier spacing is 0·51λ and the mean aerial height is 41·7 m (136 ft 9 in.) a.g.l. There are independent main feeders to each half aerial.		
Power:	A single 10 watt translator is used for each programme.		
Templet and h.r.p.:	See Fig. 3 and Note 2.		
Gain:	Mean intrinsic gain		3·9 dB
	Deduct: losses due to distribution feeder and possible mis-alignment		0·3 dB
	Mean net gain		3·6 dB
	Deduct: loss in main feeder type RPC 2603	2·2 dB	
	Network loss	0·9 dB	3·1 dB
	Mean effective gain		0·5 dB
Programme Sources:	The television programmes are obtained by s.h.f. link from Peterborough. The v.h.f. sound programmes are obtained by direct pick-up of the transmissions from Peterborough.		

Notes:

1. The form of the aerial is such that the h.r.p. can be calculated accurately.
2. The aerial design was based on a theoretical prediction of the h.r.p. of each tier assuming a cylindrical support mast electrically equivalent to the square mast section. This approximation gives reasonable accuracy since the mean tower cross-section is relatively small (0·185λ).

REFERENCE

1. Detailed information on the construction and dimensions of the aerials is given on the following drawings held by BBC Transmitter Planning and Installation Department:

P.I.D. 8780.2.3A	Arrangement of Transmitting Aerials
P.I.D. 8780.2.4A	Arrangement of Receiving Aerials

SMW

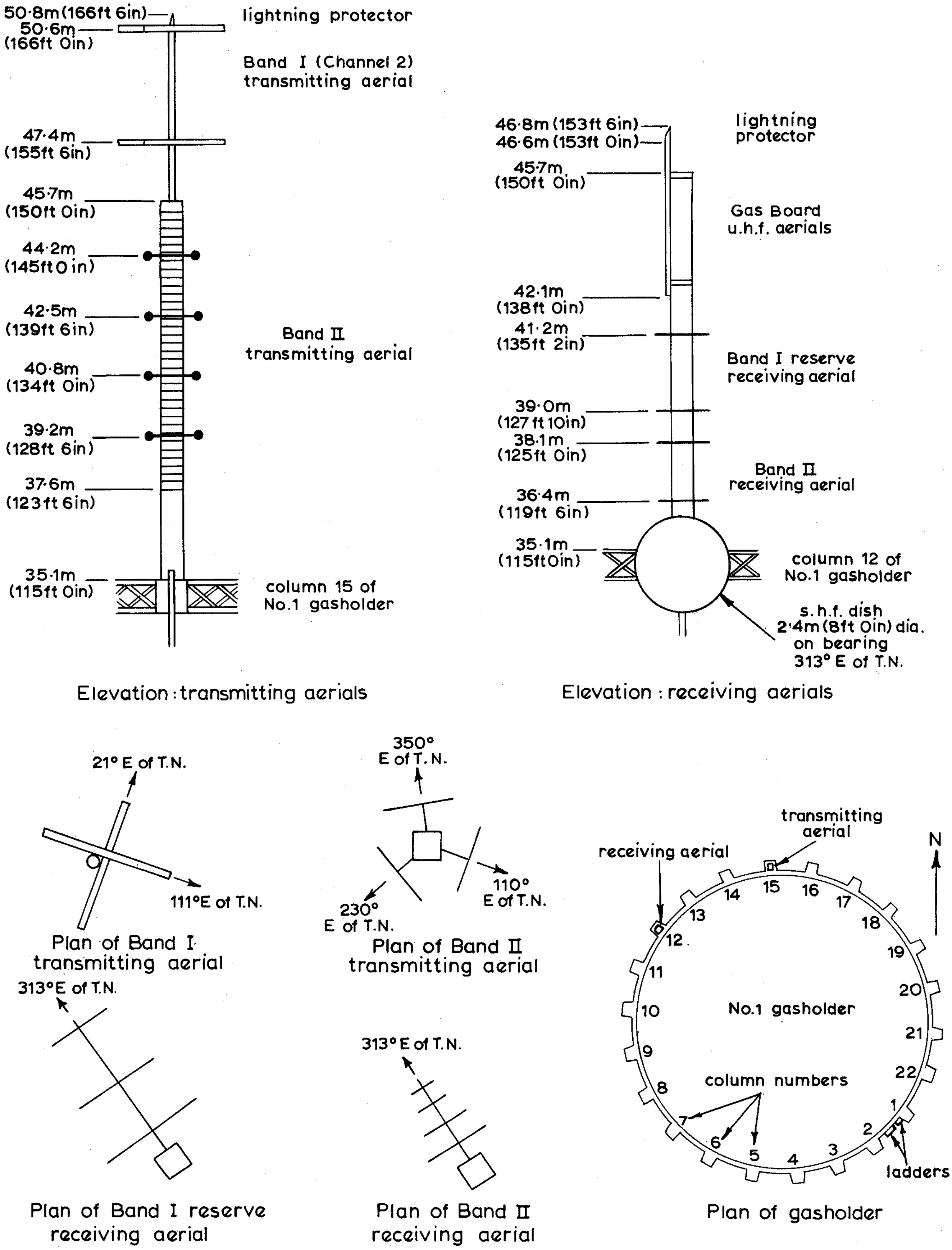

Fig. 1. General arrangement of aerials on gasholder

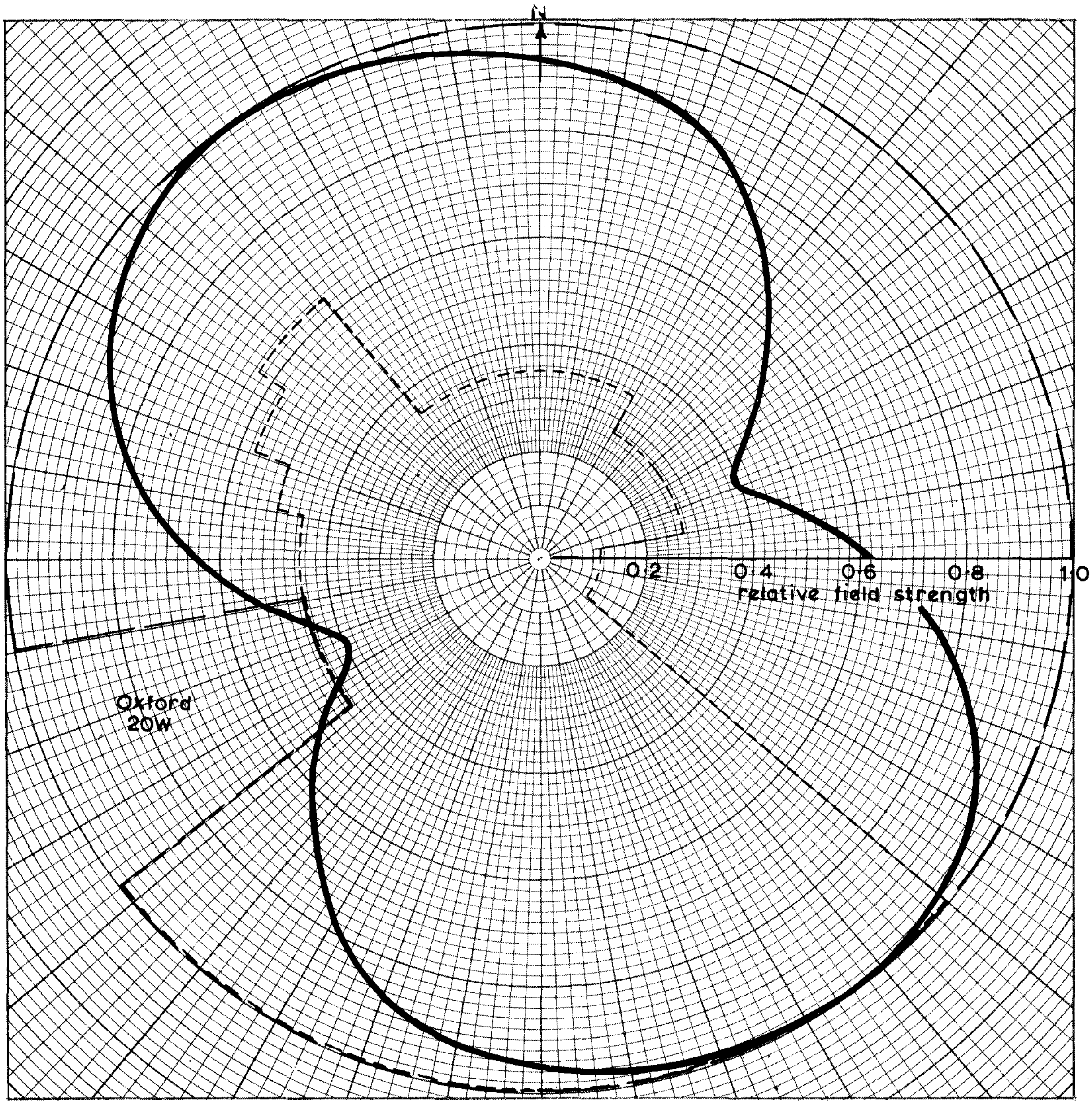

Fig. 2. Band I templet and horizontal radiation pattern
HORIZONTAL POLARIZATION

Channel 2 (Vision carrier: 51·75MHz, Sound carrier: 48·25MHz)

Mean effective gain : –1·9dB

Transmitter power : 100W

Mean E.R.P. : 65W

—— —— —— Maximum permissible E.R.P.

- - - - - - - - - Minimum desirable E.R.P.

Unit field corresponds to an E.R.P. of 100W

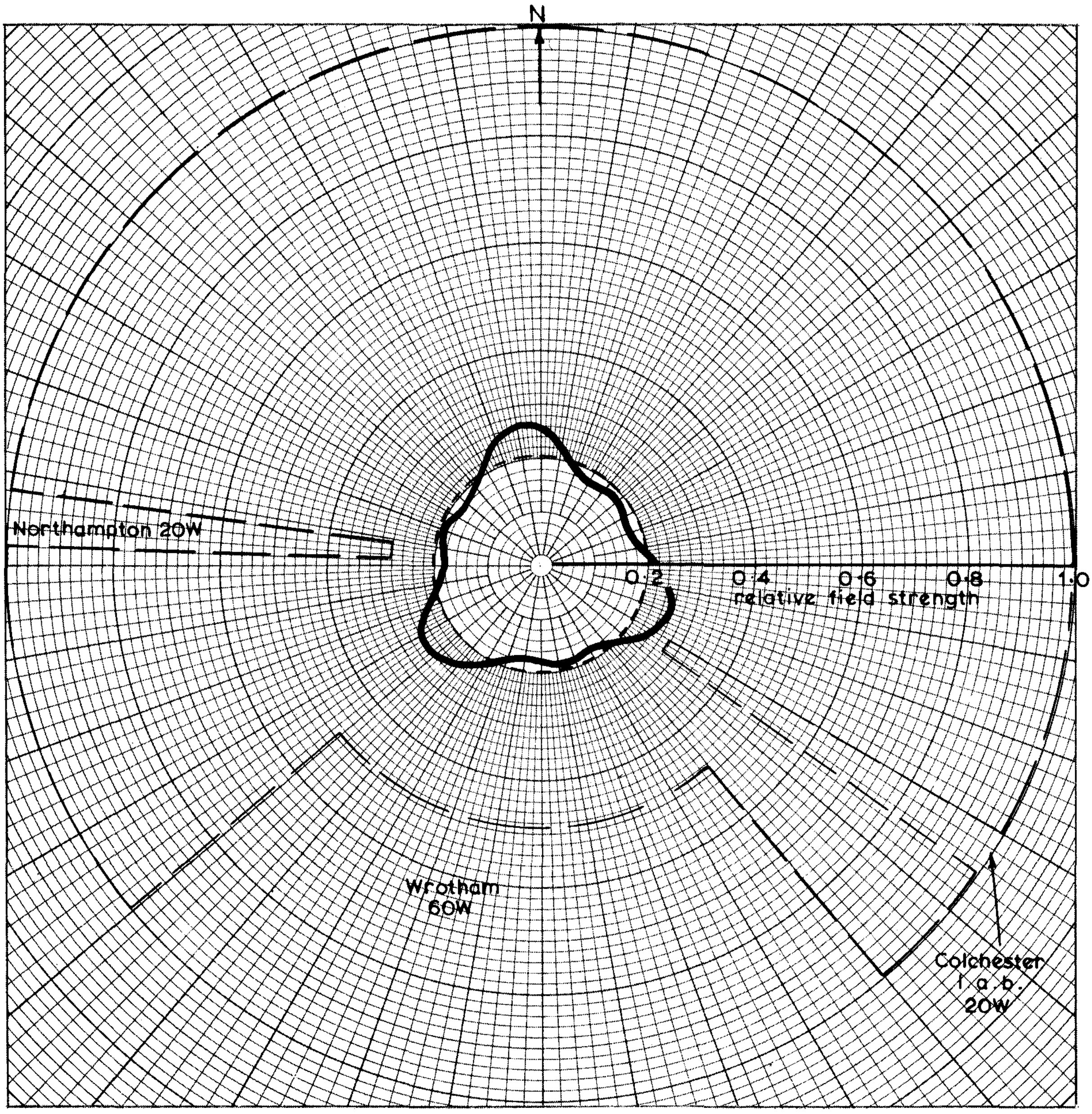

Fig.3.Band II templet and horizontal radiation pattern

HORIZONTAL POLARIZATION

88·9 (Light), 91·1 (Third), 93·3 (Home) MHz

Mean effective gain : 0·5dB

Transmitter power : 10W

Mean E.R.P. : 11·2W

—— —— —— Maximum permissible E.R.P.

- - - - - - - - - Minimum desirable E.R.P.

Unit field corresponds to an E.R.P. of 250W

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